Title: Method and Apparatus to Reduce Slot Width In tubular Members
No. 1 of 13
Inventors: Hruschak et al.
Filing Date: April 16, 2004
Atty Docket No.: 44-03

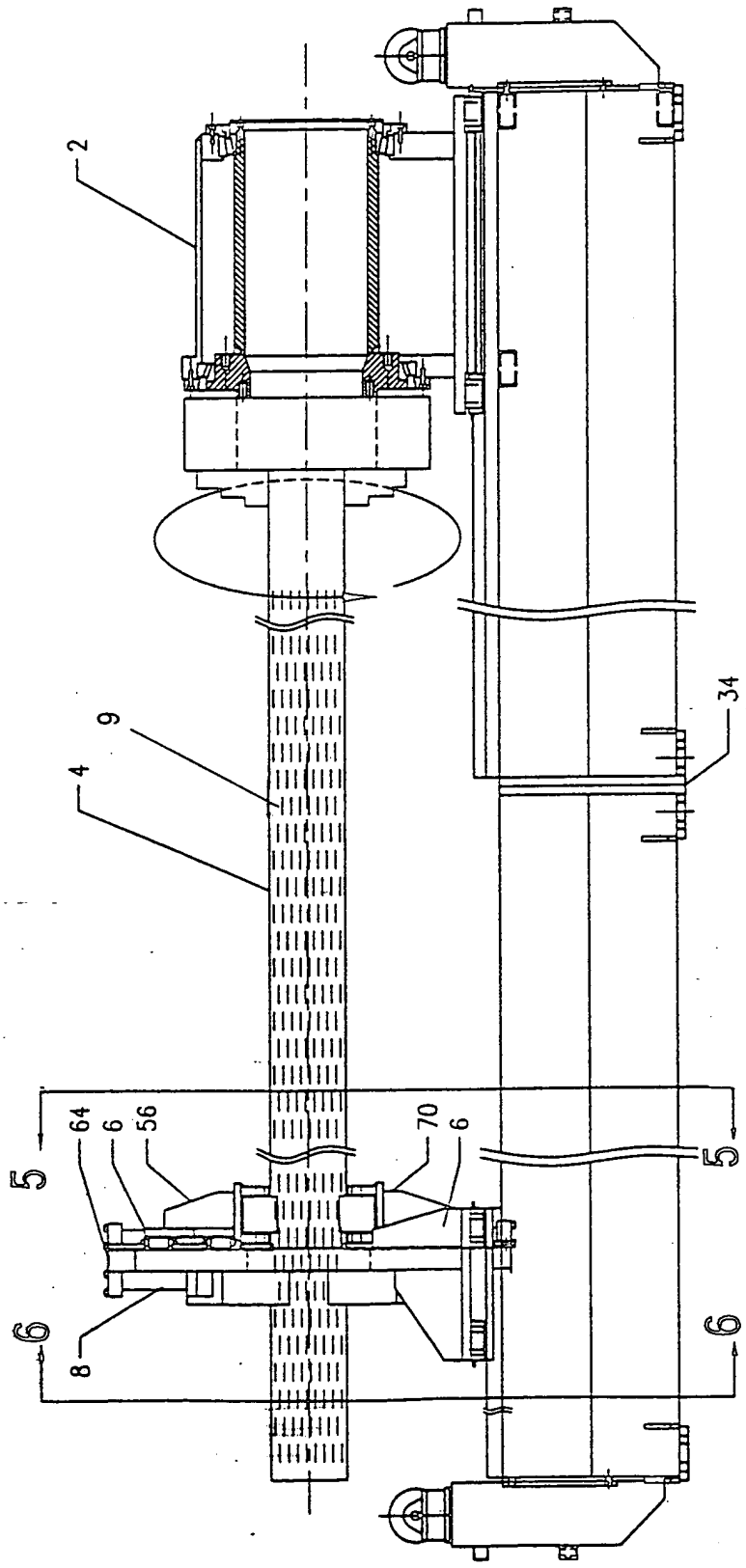


FIGURE 1

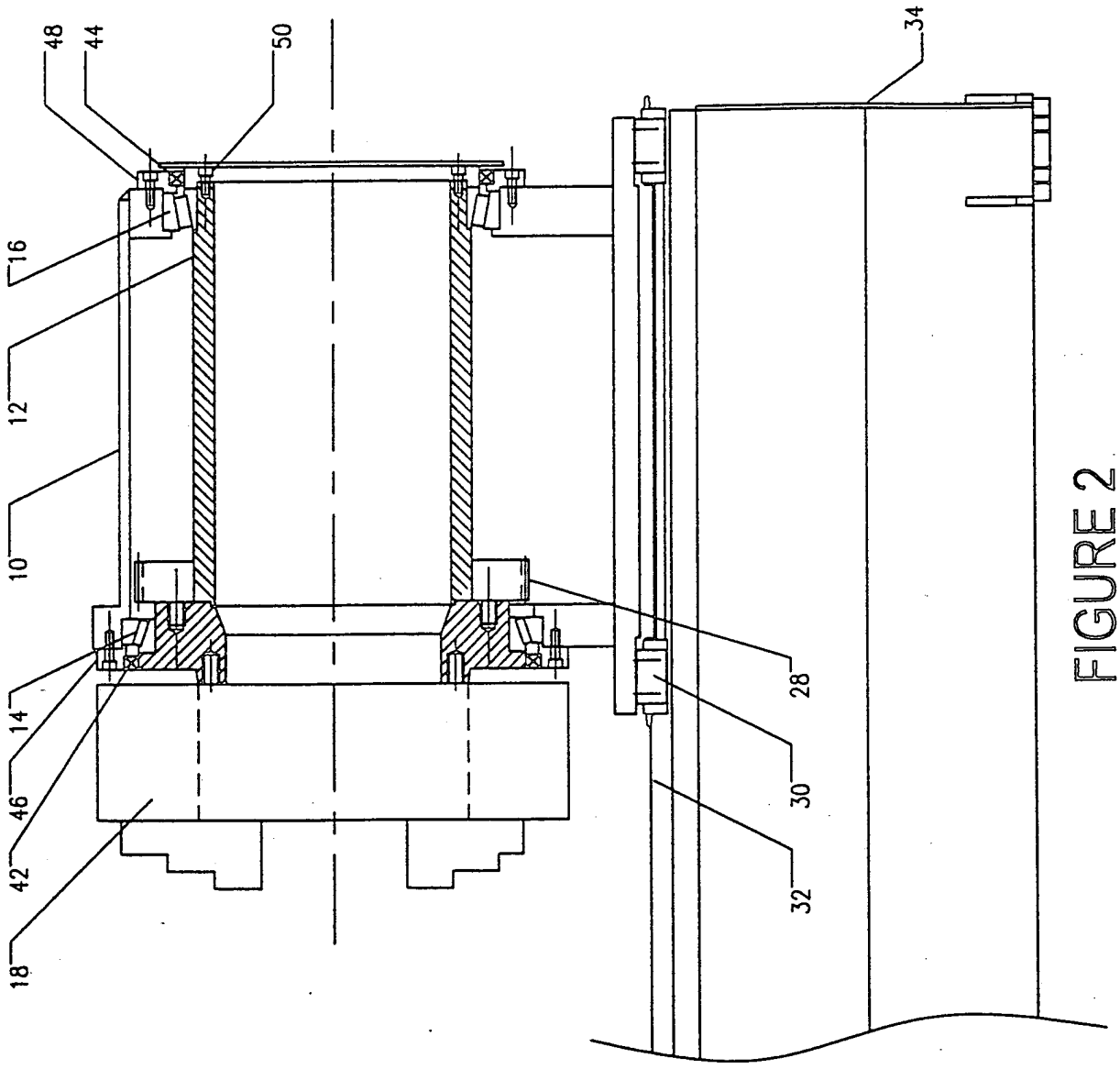


FIGURE 2

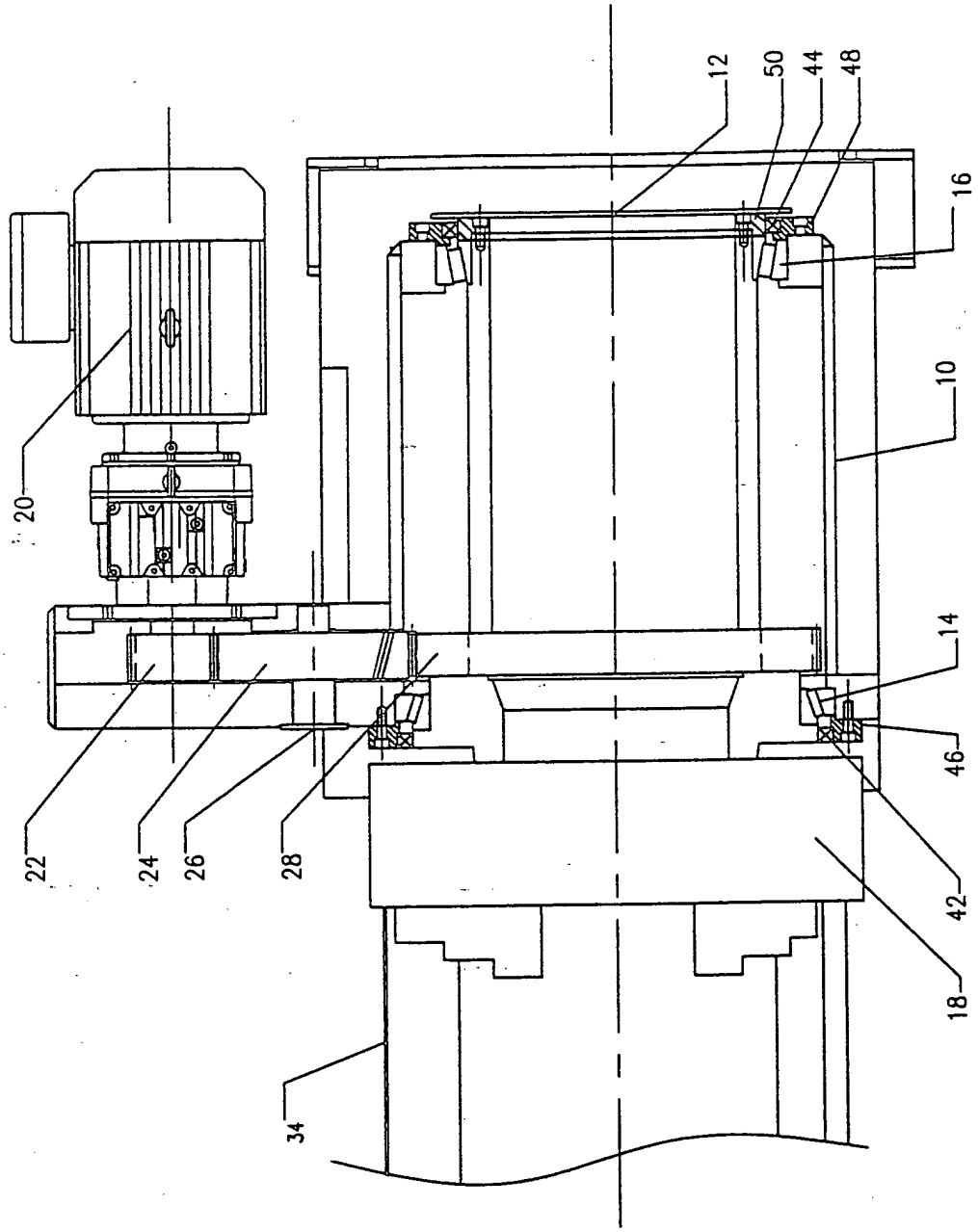
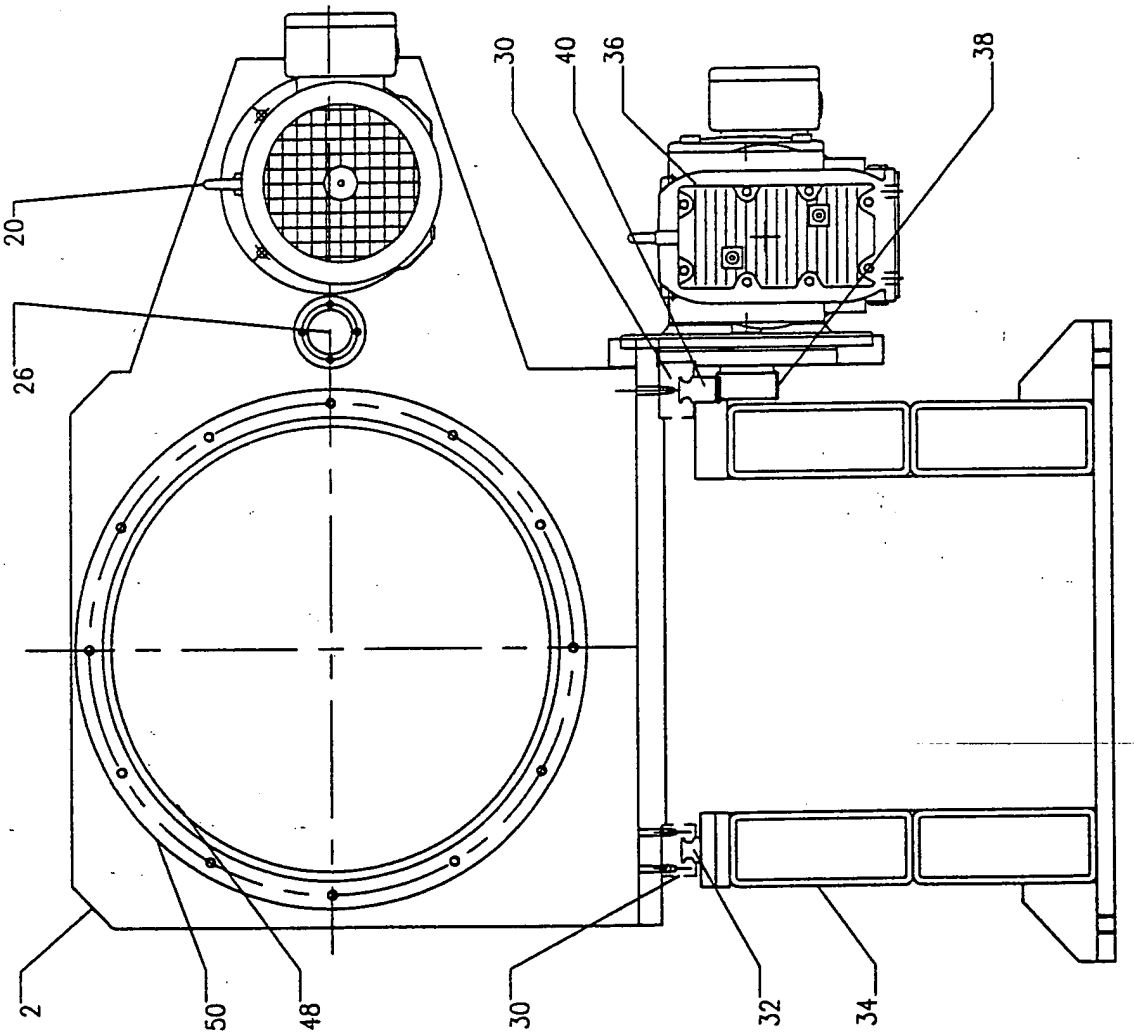


FIGURE 3



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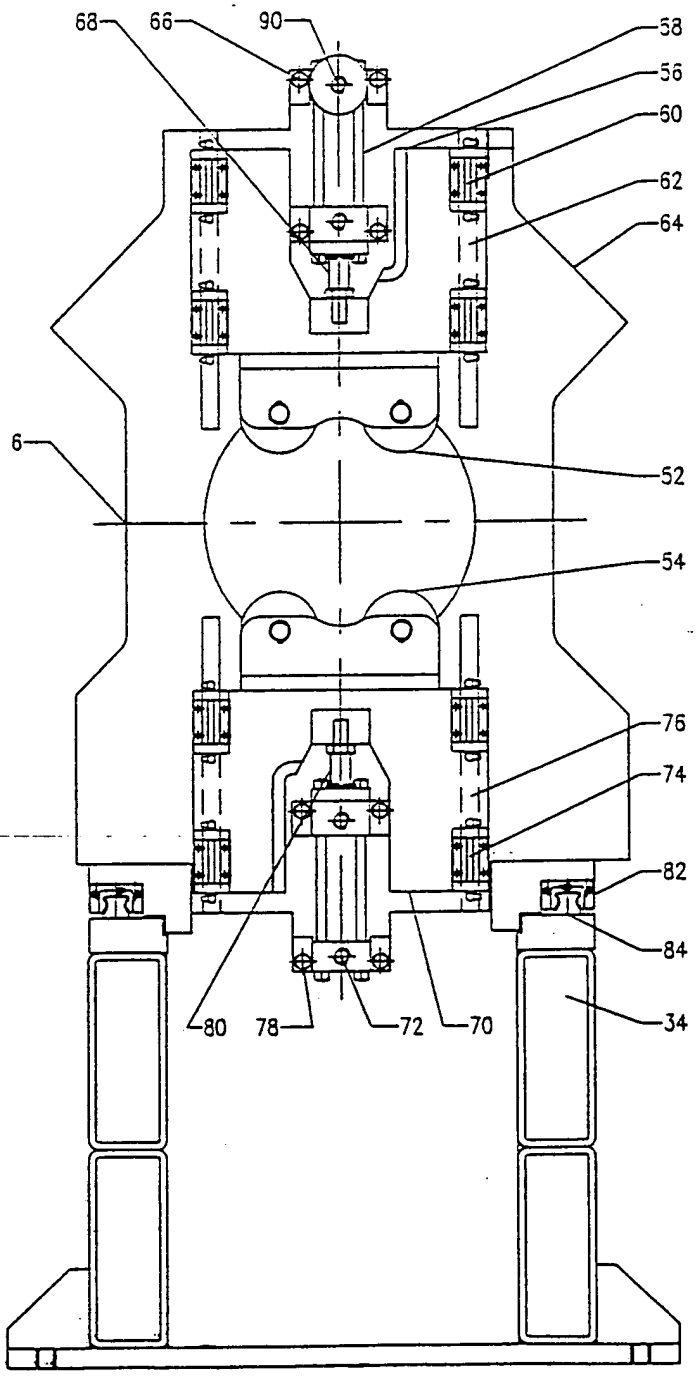

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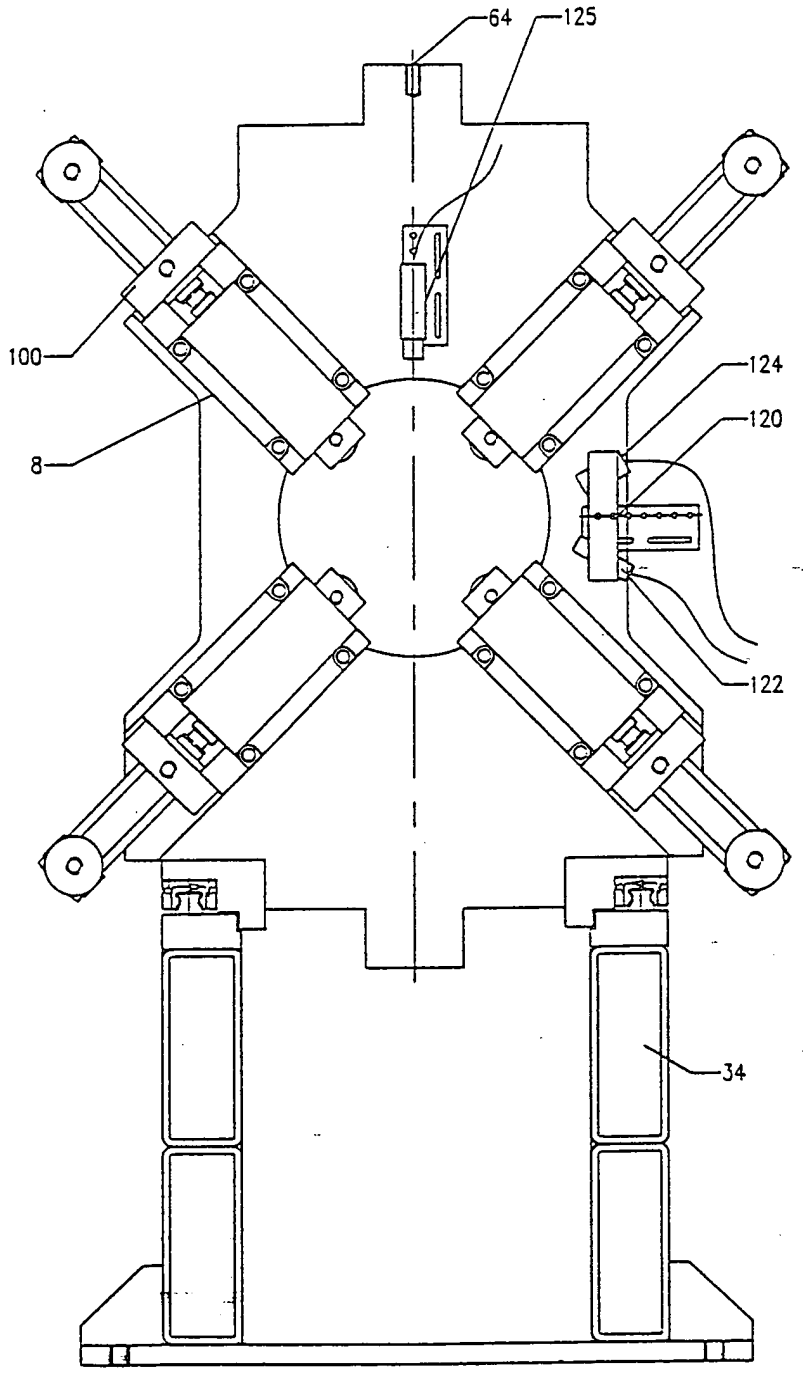

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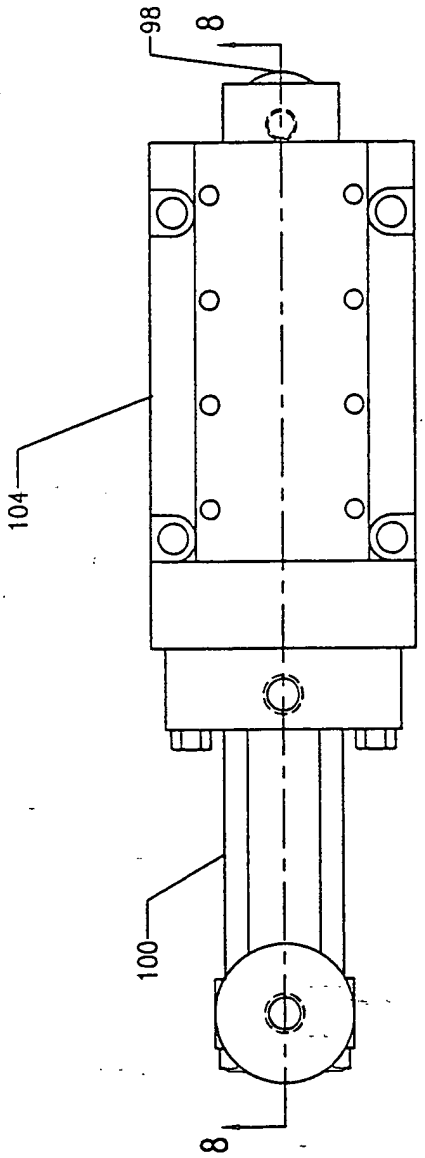

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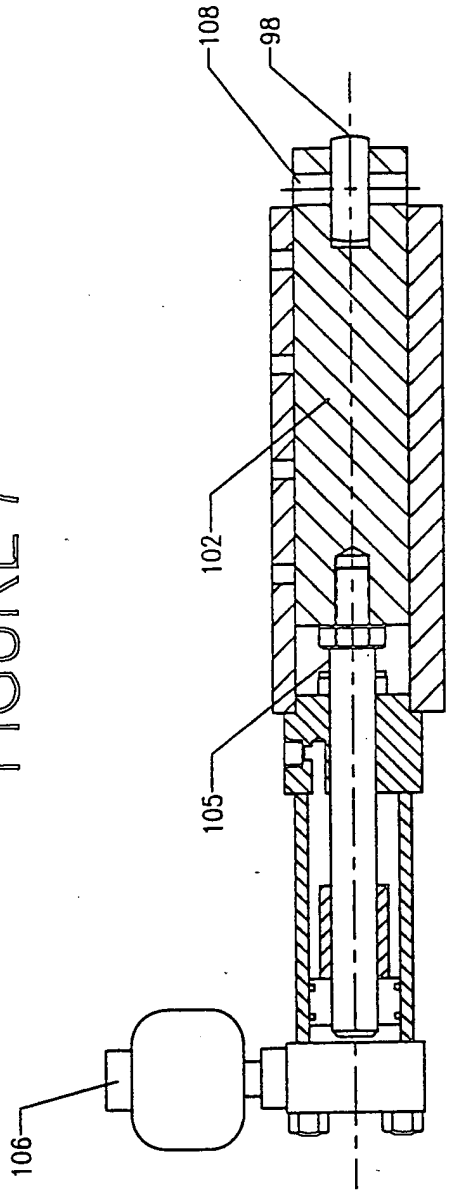

FIGURE 8

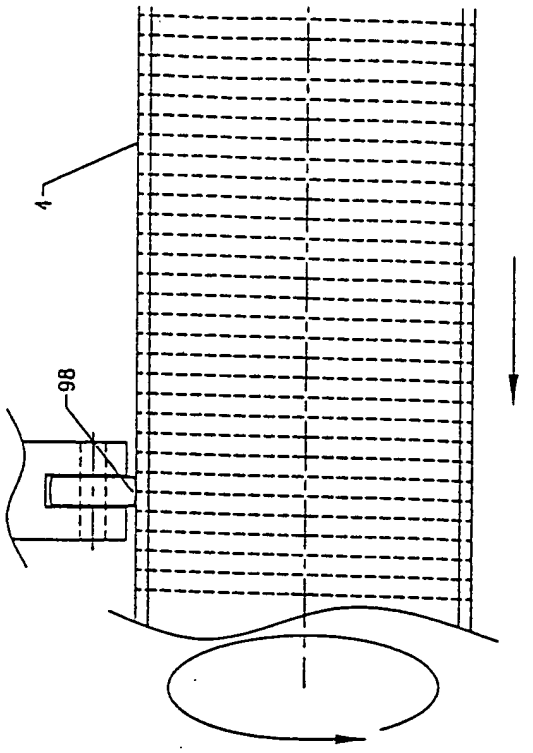

FIGURE 11

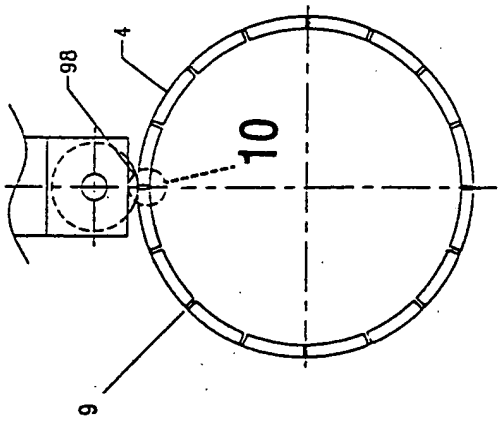

FIGURE 9

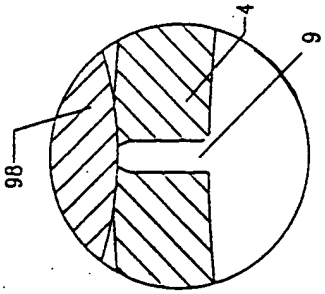

FIGURE 10

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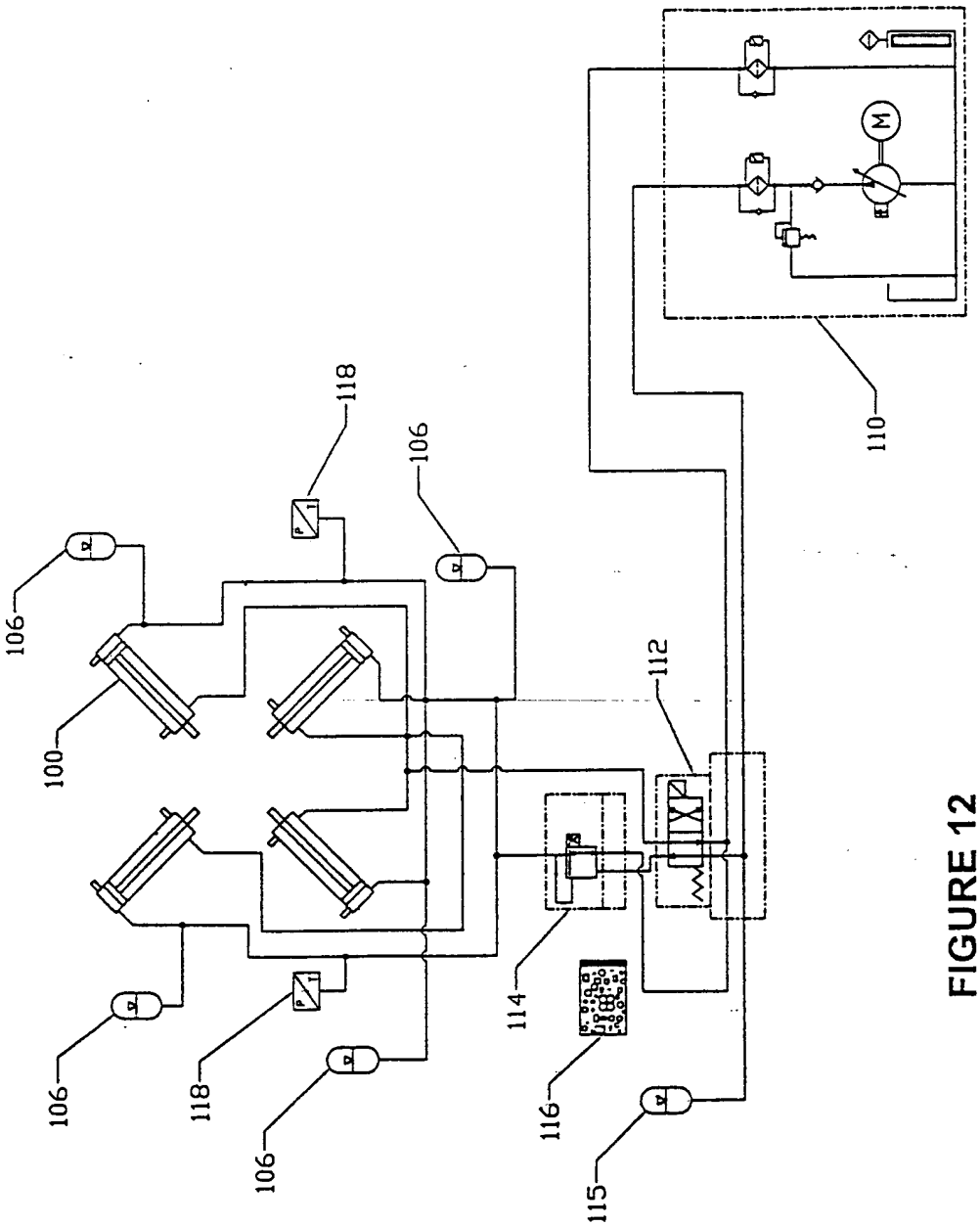


FIGURE 12

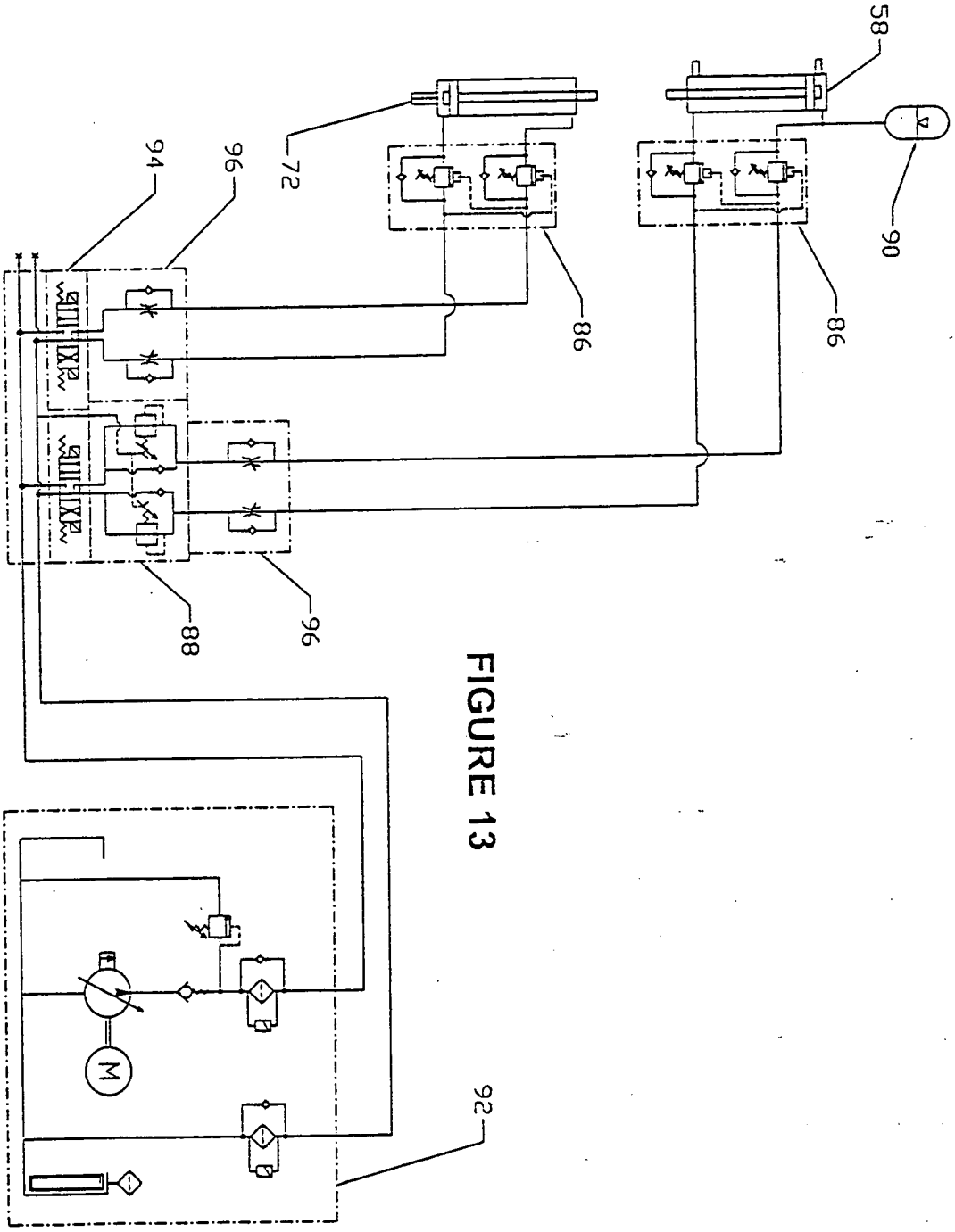


FIGURE 13

FIGURE 14A

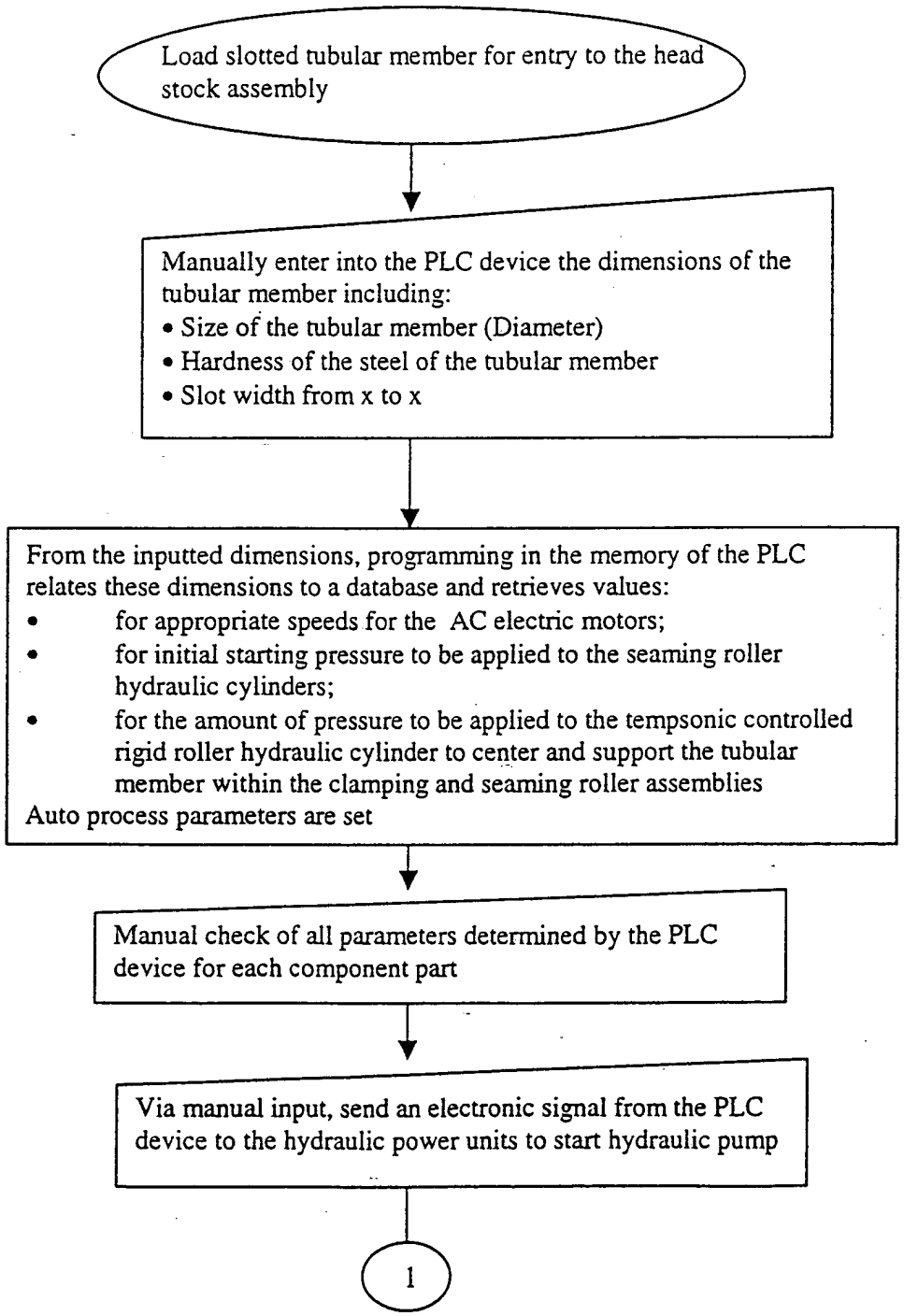
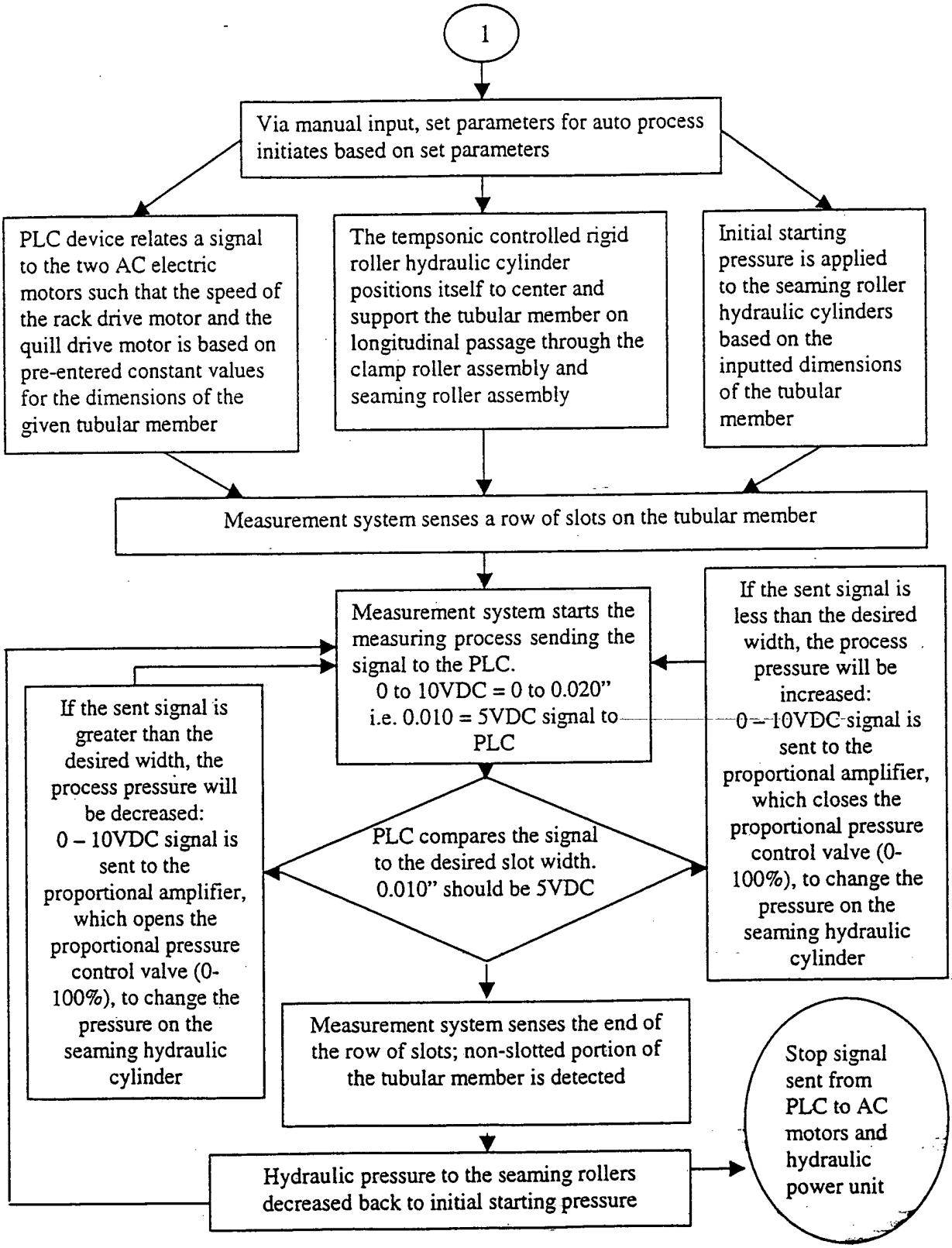

Load slotted tubular member for entry to the head stock assembly
Manually enter into the PLC device the dimensions of the tubular member including:
• Size of the tubular member (Diameter)
• Hardness of the steel of the tubular member
• Slot width from x to x
From the inputted dimensions, programming in the memory of the PLC relates these dimensions to a database and retrieves values:
• for appropriate speeds for the AC electric motors;
• for initial starting pressure to be applied to the seaming roller hydraulic cylinders;
• for the amount of pressure to be applied to the tempsonic controlled rigid roller hydraulic cylinder to center and support the tubular member within the clamping and seaming roller assemblies
Auto process parameters are set
Manual check of all parameters determined by the PLC device for each component part
Via manual input, send an electronic signal from the PLC device to the hydraulic power units to start hydraulic pump
1

FIGURE 14B


1
Via manual input, set parameters for auto process initiates based on set parameters
PLC device relates a signal to the two AC electric motors such that the speed of the rack drive motor and the quill drive motor is based on pre-entered constant values for the dimensions of the given tubular member
The tempsonic controlled rigid roller hydraulic cylinder positions itself to center and support the tubular member on longitudinal passage through the clamp roller assembly and seaming roller assembly
Initial starting pressure is applied to the seaming roller hydraulic cylinders based on the inputted dimensions of the tubular member
Measurement system senses a row of slots on the tubular member
Measurement system starts the measuring process sending the signal to the PLC.
0 to 10VDC = 0 to 0.020"
i.e. 0.010 = 5VDC signal to PLC
If the sent signal is less than the desired width, the process pressure will be increased:
0 – 10VDC signal is sent to the proportional amplifier, which closes the proportional pressure control valve (0-100%), to change the pressure on the seaming hydraulic cylinder
If the sent signal is greater than the desired width, the process pressure will be decreased:
0 – 10VDC signal is sent to the proportional amplifier, which opens the proportional pressure control valve (0-100%), to change the pressure on the seaming hydraulic cylinder
PLC compares the signal to the desired slot width.
0.010" should be 5VDC
Measurement system senses the end of the row of slots; non-slotted portion of the tubular member is detected
Hydraulic pressure to the seaming rollers decreased back to initial starting pressure
Stop signal sent from PLC to AC motors and hydraulic power unit

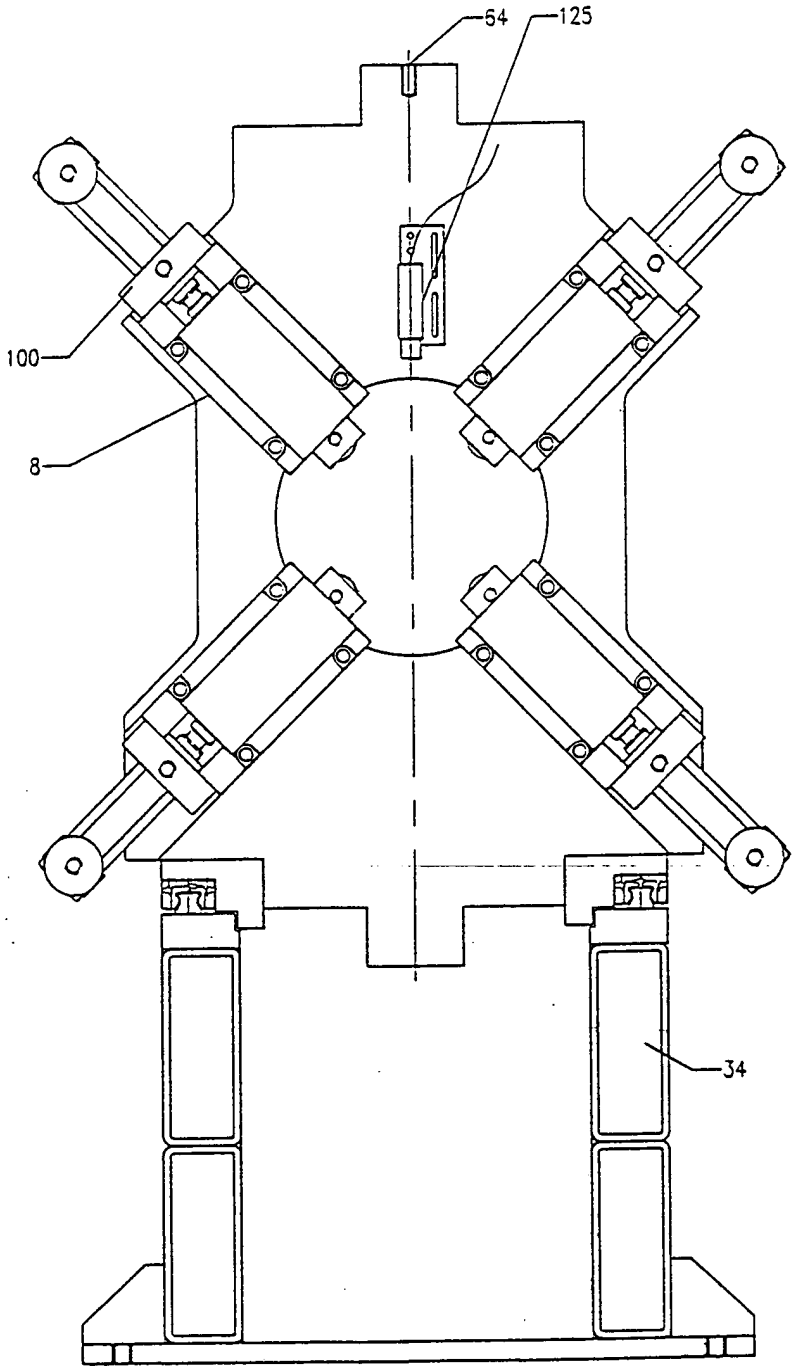


FIGURE 15